

**PSYCHIATRIC INFORMATION SYSTEMS, METHODS AND COMPUTER  
PROGRAM PRODUCTS THAT CAPTURE PSYCHIATRIC INFORMATION  
AS DISCRETE DATA ELEMENTS**

**Cross-Reference to Provisional Application**

This application claims the benefit of Provisional Application Serial No. 60/189,508, filed March 15, 2000, by the present inventor, the disclosure of which is hereby incorporated herein by reference in its entirety as if set forth fully herein.

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**Field of the Invention**

This invention relates to information processing systems, methods and computer program products, and more particularly to medical information processing systems, methods and computer program products.

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**Background of the Invention**

Medical information processing systems, methods and computer program products are widely used in hospitals, clinics, physicians' offices, research studies and/or other medical environments, to capture medical information. The medical information that is captured can be stored in one or more databases, and can be manipulated as database elements.

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However, in sharp contrast to other fields of medicine, psychiatry generally is a text-based practice, wherein patient histories, diagnoses, assessments and treatment plans are described using free-form text. See, for example, the publication entitled *Databases for Clinical Psychiatry* by Guze, M.D. et al., M.D. Computing, Vol. 13, No. 3, 1996, pp. 210-215, the disclosure of which is incorporated herein by reference.

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**Summary of the Invention**

Embodiments of the present invention provide psychiatric information systems, methods and computer program products that include an emergency room module, an outpatient module and a scales module. The emergency room module is configured to capture psychiatric information concerning emergency room visits by

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psychiatric patients, including psychiatric assessments, as discrete data elements. The outpatient module is configured to capture psychiatric information concerning outpatient visits by psychiatric patients, including psychiatrist assessments, as discrete data elements. The scales module is configured to capture direct data entry of

5 psychiatric scales as discrete data elements. A database repository also is included that is configured to store the discrete data elements that are captured by the emergency room module, the outpatient module and the scales module.

Psychiatry has a rich tradition of clinical information being recorded into a descriptive free-text prose. The nuances of a patient's history and the description of a

10 patient's life may be recorded in the richness of the author's writings. Embodiments of the present invention can facilitate this rich and important aspect of the psychiatry, while simultaneously collecting discrete data elements, like medication side effects, lab values, medical history and/or allergies that psychiatrists may desire to know in order to deliver quality care. In fact, embodiments of the invention can collect

15 discrete data elements on every aspect of a patient's medical record, from social and developmental history to physical exams.

Psychiatric information systems, methods and computer program products according to other embodiments of the invention also include a query module that is configured to initiate queries of the discrete data elements that are captured by the

20 emergency room module, the outpatient module and the scales module that are stored in the database repository. Some embodiments also include a data mining module that is configured to perform data mining of the discrete data elements that are captured by the emergency room module, the outpatient module and the scales module that are stored in the database repository, to produce data mining results that

25 are free of personal identifying information on the psychiatric patients. Secure, deidentified results therefore may be provided.

Still other embodiments include a research module that is configured to capture psychiatric information concerning individuals who are participating in a psychiatric research study, as discrete data elements. In these embodiments, the

30 database repository is further configured to store the discrete data elements that are captured by the research model.

Still other embodiments include a billing module that is configured to generate medical bills from the discrete data elements that are captured by the emergency room module, the outpatient module and the scales module that are stored in the database

repository. In some embodiments, the billing module is further configured to complete government and insurance forms, preferably automatically, from the discrete data elements that are captured by the emergency room module, the outpatient module and the scales module that are stored in the database repository.

5 In still other embodiments, a treatment plan module is configured to capture a treatment plan for individuals that are undergoing psychiatric treatment, as discrete data elements. In these embodiments, the database repository is further configured to store the discrete data elements that are captured by the treatment plan module.

10 In still other embodiments of the invention, the emergency room module, the outpatient module and the scales module are configured to capture the discrete data elements using at least one dialogue box. As is well known to those having skill in the art, a dialogue box is a computer display window that contains a form or checklist to be filled out, and can include text boxes, regular list boxes, drop-down list boxes, check boxes, and/or sliding controls.

15 Other psychiatric information systems, methods and computer program products according to embodiments of the present invention include a psychiatric diagnosis dialogue box, a past psychiatric history dialogue box, a social history dialogue box and a mental status exam dialogue box. The psychiatric diagnosis dialogue box is configured to capture psychiatric diagnoses of psychiatric patients as discrete data elements. The past psychiatric history dialogue box is configured to capture past psychiatric histories of psychiatric patients as discrete data elements. The social history dialogue box is configured to capture social histories of psychiatric patients as discrete data elements. The mental status exam dialogue box is configured to capture results of standardized mental status tests of psychiatric patients as discrete data elements. These embodiments also include a database repository that is configured to store the discrete data elements that are captured by the psychiatric diagnosis dialogue box, the past psychiatric history dialogue box, the social history dialogue box and the mental status exam dialogue box.

25 Still other embodiments include a medical history dialogue box, a substance history dialogue box, a medications dialogue box, an allergies dialogue box, a developmental dialogue box, a family history dialogue box, a physical exam dialogue box, and/or a labs/imaging dialogue box. The medical history dialogue box is configured to capture non-psychiatric medical histories of psychiatric patients as discrete data elements. The substance history dialogue box is configured to capture

histories of substance use by psychiatric patients as discrete data elements. The medications dialogue box is configured to capture information concerning medications used by psychiatric patients as discrete data elements. The allergies dialogue box is configured to capture information concerning allergies of psychiatric patients as discrete data elements. The developmental dialogue box is configured to capture information concerning stages of development of psychiatric patients as discrete data elements. The family history dialogue box is configured to capture information concerning family histories of psychiatric patients as discrete data elements. The physical exam dialogue box is configured to capture information concerning physical exams of psychiatric patients as discrete data elements. Finally, the labs/imaging dialogue box is configured to capture results of laboratory tests and medical imaging tests of psychiatric patients as discrete data elements. The database repository is further configured to store the discrete elements that are captured by the above-described dialogue boxes.

In yet other embodiments, a query module may be included to initiate queries of the discrete data elements that are captured by the psychiatric diagnosis dialogue box, the past psychiatric diagnosis dialogue box, the social history dialogue box and the mental status exam dialogue box that are stored in the database repository. In some embodiments, a data mining module is provided, that is configured to perform data mining of the discrete data elements, to produce data mining results that are free of personal identifying information on the psychiatric patients.

In still other embodiments, a billing module is provided that is configured to generate medical bills from the discrete data elements, and may be further configured to complete government and insurance forms from the discrete data elements. An assessment plan module also may be provided that is configured to generate an assessment plan for individuals that are undergoing psychiatric treatment, from the discrete elements that are stored in the database repository.

Still other psychiatric information systems, methods and computer program products according to embodiments of the invention include a psychiatric information module that is configured to capture psychiatric information concerning psychiatric patients, including psychiatric assessments, as discrete data elements. A database repository is configured to store the discrete data elements that are captured by the psychiatric information module. In some embodiments, a non-psychiatric medical information module also is provided that is configured to capture non-psychiatric

medical information concerning psychiatric patients as discrete data elements. In these embodiments, the database repository also may be configured to store the discrete data elements that are captured by the non-psychiatric medical information module. A query module, a data mining module and a billing module also may be provided, as was described above.

Embodiments of the present invention can manage a psychiatric emergency room by storing information concerning an emergency room psychiatric patient, including results of psychiatric tests and non-psychiatric medical tests, in a database. A report is displayed of the information concerning the emergency room psychiatric patient, for review by a psychiatrist. A selection of whether to commit the psychiatric patient or to treat the psychiatric patient on an outpatient basis is accepted, preferably from a psychiatrist. Forms automatically are generated for committing the psychiatric patient or for treating the psychiatric patient on an outpatient basis in response to the selection. In some embodiments, hospital admittance forms are automatically generated in response to the selection to commit the psychiatric patient, and outpatient appointment forms automatically generated in response to the selection to treat the psychiatric patient on an outpatient basis.

In other embodiments, treatment of psychiatric patients is managed by storing information concerning symptoms, medication, psychiatric tests, psychiatric history and medical history of a psychiatric patient in a database. At least some of the stored information is displayed, preferably for psychiatrist review. A treatment recommendation for the psychiatric patient is accepted in response to the display. The treatment recommendation is stored in a database. A treatment plan for the psychiatric patient is automatically generated from the stored information and from the stored treatment recommendation.

Yet other embodiments provide for billing for psychiatric treatment. In particular, a diagnosis of a psychiatric patient is stored in a database. Identifications of providers of psychiatric services are stored in a database. A bill is automatically generated for psychiatric treatment of the psychiatric patient from the diagnosis that is stored and the identifications that are stored.

Accordingly, traditionally text-based psychiatric information may be captured as data elements, using dialogue boxes, to thereby allow the discrete data elements to be stored, queried, mined and/or otherwise used as discrete data elements of a database. Moreover, psychiatric information systems, methods and computer

program products may be integrated with medical information systems, methods and computer program products and may be used to manage psychiatric care.

### **Brief Description of the Drawings**

5           Figure 1 is a block diagram of psychiatric information systems, methods and computer program products according to embodiments of the present invention.

          Figures 2A-2C, which when placed together as indicated form Figure 2, illustrate other psychiatric information systems, methods and computer program products according to other embodiments of the invention.

10           Figure 3 is a flowchart illustrating the generation of reports, forms and other documentation for a psychiatric emergency room according to embodiments of the present invention.

          Figure 4 is a flowchart of psychiatrist and database interaction to produce a treatment plan for a psychiatric patient according to embodiments of the present  
15           invention.

          Figure 5 is a flowchart of interactions among psychiatrists, other personnel and databases to produce billings for psychiatric treatment according to embodiments of the present invention.

### **Detailed Description of Preferred Embodiments**

20           The present invention will be described below with reference to block diagrams and/or flowchart illustrations of methods, apparatus (systems) and/or computer program products according to embodiments of the invention. It is understood that each block of the block diagrams and/or flowchart illustrations, and combinations of blocks in the block diagrams and/or flowchart illustrations, can be  
25           implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, and/or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer and/or other programmable data processing apparatus, create means for implementing  
30           the functions specified in the block diagrams and/or flowchart block or blocks.

          These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the

computer-readable memory produce an article of manufacture including instructions which implement the function specified in the block diagrams and/or flowchart block or blocks.

5 The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer implemented method such that the instructions which execute on the computer or other programmable apparatus provide steps for implementing the functions specified in the block diagrams and/or flowchart block or blocks.

10 It should also be noted that in some alternative implementations, the functions noted in the blocks may occur out of the order noted in the flowcharts. For example, two blocks shown in succession may in fact be executed substantially concurrently or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved.

15 The present invention may be embodied in a data processing system that can function in multiple arenas and platforms, including client/server, standalone, briefcase and thin-client. This multi-platform model can facilitate distributed data collection in psychiatric clinical settings, with data processing and analysis performed through a central data repository.

20 Accordingly, a data processing system may be configured with computational, storage and control program resources for capturing psychiatric information as discrete data elements, in accordance with embodiments of the present invention. Thus, the data processing system may be contained in one or more enterprise, personal and/or pervasive computing devices, which may communicate over a  
25 network that may be a wired and/or wireless, public and/or private, local and/or wide area network such as the World Wide Web and/or a sneaker network using portable media. Moreover, when integrated into a single computing device, communication may take place via an Application Program Interface (API).

Embodiments of a psychiatric information processing system may include  
30 input device(s), such as a keyboard or keypad, a display, and a memory that communicate with one or more processors. The psychiatric information processing system may further include a storage system, a speaker, and one or more input/output (I/O) data port(s) that also communicate with the processor(s). The storage system may include solid state memory such as Dynamic Random Access Memory (DRAM)

and/or Static RAM (SRAM), removable and/or fixed media, such as floppy disks, ZIP drives, hard disks, or the like, as well as virtual storage, such as a RAMDISK. The I/O data port(s) may be used to transfer information between the psychiatric information processing system and another computer system or a network (*e.g.*, the Internet). These components may be conventional components such as those used in many conventional computing devices, which may be configured to operate as described herein.

The memory may include an operating system to manage the psychiatric information processing system resources and one or more application programs including one or more application programs for capturing psychiatric information as discrete data elements, according to embodiments of the present invention.

Referring now to Figure 1, psychiatric information systems, methods and computer program products according to embodiments of the present invention are illustrated. It will be understood that the term "psychiatrist" is used herein as a generic term for a provider of psychiatric care, and can include, for example, psychologists, social workers, therapists, etc. As shown in Figure 1, these psychiatric information systems, methods and computer program products **100** are organized into several interactive modules.

An emergency room module **110** is configured to capture psychiatric information concerning emergency room visits by psychiatric patients, including psychiatric assessments, as discrete elements. The emergency room module **110** can operate seven days a week, twenty-four hours a day, to help emergency room physicians accurately and efficiently assess and record all emergency room visits as they come in.

An outpatient module **120** is configured to capture psychiatric information concerning outpatient visits by psychiatric patients, including psychiatric assessments, as discrete data elements. For example, the outpatient module **120** can handle electric records in an affective disorders clinic.

The scales module **130** is configured to capture direct data entry of psychiatric scales as discrete data elements. For example, psychiatric scales, such as the Montgomery-Åsberg Depression Rating Scale (MADRS), Hamilton Depression Scale, Clinical Global Impression (CGI), Mini-Mental Status Examination, etc., can be captured for direct data entry. The scales can be chosen from a large pick-list of



choices, can be administered, and can be viewed in a graphical format within the psychiatric lab. The scales can be entered by a patient and/or a psychiatrist.

A research module **150** is configured to capture psychiatric information concerning individuals who are participating in a psychiatric research study, as  
5 discrete data elements. For example, the research module **150** may be used as a centralized data collection system in a National Institute of Health (NIH) study for depression in the elderly.

A treatment plan module **170** is configured to capture a treatment plan for individuals who are undergoing psychiatric treatment, as discrete data elements.  
10 Thus, the treatment plan module **170** can create a bio/psycho/social treatment plan that measures a patient's functionality, and can be used as a guideline to future treatment, for referrals and/or for insurance recertification.

Still referring to Figure 1, a database repository **180** also is included that is configured to store the discrete data elements that are captured by the emergency  
15 room module **110**, the outpatient module **120**, the scales module **130**, the research module **150** and/or the treatment plan module **170**. A query module **140** is configured to initiate queries of the discrete data elements that are captured by the other modules and that are stored in the database repository **180**. A data mining module **142** also may be used to mine the clinical data repository **180**. The data mining module **142**  
20 may be coupled to the query module **140**, as shown, or may be independent thereof. Examples of data queries include clinical queries of treatment effectiveness or management queries for utilization review.

Data elements that are stored in the database repository **180** are accessible to all investigators with access privileges through the query module **140**. The query  
25 module **140** can contain a user-based query engine that allows investigators to remotely create their own queries and perform data analysis using OnLine Analytical Processing (OLAP). Investigators also have the option of downloading their query results into a local database, such as Microsoft Access 2000, or a statistical program for further processing. Although data is accessible remotely, it remains secure and  
30 unaltered on the main server. Confidentiality is maintained by stripping all patient-identifying data elements prior to query results.

Finally, a billing module **160** is configured to generate medical bills from the discrete data elements that are stored in the database repository **180**. A forms/reports module **190** can be used to complete government, insurance and/or other forms,

preferably automatically, from the discrete data elements that are stored in the database repository. The billing module **160** and the forms/reports module **190** can be used for electronic filing for the psychiatric outpatient clinics and to record data for utilization review.

5           The discrete data elements that are collected by the emergency room module **110**, the outpatient module **120**, the scales module **130**, the research module **150**, and the treatment plan module **170** can offer a unique set of advantages over conventional free text. Data elements can be manipulated, queried and inserted. They can be used for research, to populate forms, for regulatory requirements and/or for utilization  
10 review. These are all important aspects of a regulated health care industry, but often are at cross-purposes in delivering efficient, sensitive care to psychiatric patients. Embodiments of the present invention can collect these elements, store them in the database repository **180**, and automatically and seamlessly embed them within an electronic record.

15           In the past, research generally has set up parallel and redundant systems to collect data elements by gathering information in standardized forms, which were later double-entered by hand and then rechecked. In sharp contrast, embodiments of the present invention as shown in Figure 1 can eliminate redundancy by combining research and clinical care in the same process/system. Data accuracy also may be  
20 increased by having the information directly entered by either patients or staff, to thereby reduce and preferably eliminate data entry errors, while at the same time allowing costs to be lowered.

Additional description of embodiments of the scales module **130** now will be provided. The scales module **130** can provide an indirect data entry system from  
25 patients. This data can be collected using reliable and valid psychiatric scales like the Carroll Depression Scale, for example using an optical scan mark sense form. For the patient's self diagnosis, the forms can be automatically preprinted with the patient's name and a unique identifier. The patient then completes the scale, which is then placed into a continuous feeding optical scanner or other input device. The data then  
30 is automatically processed and stored in the database repository **180**.

The scales function **130** also may be extended to provide a Windows-based, real time data collection engine that can provide Continuous Quality Improvement (CQI) to the practice of psychiatry. By redefining quality medical care from service delivery and documentation to outcome-based treatment and intervention, the practice

of psychiatry can be redirected to an approach focused on clinical effectiveness. Quantifying quality and efficiency with CQI can provide enormous advantages, such as lower cost, increased efficiency and/or improved clinical care. Thus, by using the scales module **130** for patient and/or psychiatrist entry at various points in time, the  
5 delivery, cost and effectiveness of psychiatric care of a patient can be monitored over time. The query module and/or data mining module **142** also can be used to monitor progress for large groups of patients.

Additional details of the forms/reports module **190** now will be provided. The data that was obtained from the emergency room, outpatient, scales and treatment  
10 plan modules can be used by the forms/reports module **190** to provide a graphical report that can be presented like a traditional medical lab. For example, in a medical lab, an internist concerned about renal failure in a patient might order a creatinine, and compare the results to other values over time. In the medical example, the trend of a high creatinine distinguishes chronic renal insufficiency from acute renal failure. In  
15 the forms/reports module **190** for psychiatric data, psychiatric data is presented in a usable format, such as a bar chart or line graph that can be viewed or printed by the clinician in the office. This format can help the clinician detect the reoccurrence of a psychiatric illness, such as the symptoms of depression or anxiety, enabling an early intervention and treatment. Moreover, a clinical summary may be created that  
20 combines the information described above with other clinical data, including a medical and psychiatric problem list, an adverse reactions and allergies list, a present medications list and most recent laboratory values. The clinical summary may be used to provide a one-page snapshot of patient information for use by clinicians.

Additional description of the research module **150** now will be provided.  
25 Psychiatry has a rich tradition of clinical information being recorded into a descriptive free-text prose. The nuances of a patient's history and the description of a patient's life may be recorded in the richness of the author's writings. Embodiments of the present invention can facilitate this rich and important aspect of the psychiatry, while simultaneously collecting discrete data elements, like medication side effects, lab  
30 values, medical history and/or allergies that psychiatrists may desire to know in order to deliver quality care. In fact, embodiments of the invention can collect discrete data elements on every aspect of a patient's medical record, from social and developmental history to physical exams.

Figures 2A-2C, which when placed together as indicated form Figure 2, illustrate psychiatric information systems, methods and computer program products according to other embodiments of the invention that can be used in an emergency room setting to provide, for example, the emergency room module **110** of Figure 1.

5 Similar embodiments can be used in a clinical, research or other settings.

As shown in Figure 2A, in order to enter or retrieve data concerning a patient, the patient may need to be identified. Accordingly, operations can begin by accessing a log-on page at Block **202**, and upon successful log-on, accessing a main menu at Block **204**. A search page may be accessed from the main menu at Block **206**, and a  
 10 search for a patient may be performed at Block **208**. As shown at Block **208**, the search may be performed of a psychiatric database and/or a Medical Center (MC) database. At Block **212**, if multiple patients are found, then a multiple patient dialogue box is presented at Block **214**, and a correct patient is chosen. If multiple patients are not found, then at Block **216**, if a new entry is being made, then a  
 15 demographic dialogue box is opened at Block **218**. If a new entry is not desired to be entered at Block **216**, then a non-editable patient record is accessed at Block **222**. If a new entry for the patient is desired to be entered at Block **224**, the demographic dialogue box **218** is accessed again so that the new entry can be added. If not, then the search page is again accessed at Block **206**. Accordingly, a patient may be  
 20 identified and demographic data may be entered.

The emergency room module **110**, outpatient module **120**, scales module **130**, research module **150** and treatment plan module **170** of Figure 1 each may include the dialogue boxes shown in Figure 2B. The dialogue boxes all interact with a database repository **230**, labeled as "history and physical" in Figure 2B, which may be the same  
 25 as the database repository **180** of Figure 1. As is well known to those having skill in the art, a dialogue box is a computer display window that contains a form or checklist for the user to fill out. These forms can include text boxes, regular list boxes, drop-down list boxes, check boxes and/or sliding controls. See, for example, *Windows 95 for Dummies, Second Edition*, by Rathbone, IBG Books Worldwide Inc., 1997.

30 As shown in Figure 2B, the following dialogue boxes may be included: a psychiatric diagnosis dialogue box **231**, a medical history dialogue box **232**, a substance history dialogue box **233**, a medications dialogue box **234**, an allergies dialogue box **235**, a past psychiatric history dialogue box **236**, a developmental dialogue box **237**, a social history dialogue box **241**, a family history dialogue box

242, a mental status exam dialogue box 243, a mini mental status exam dialogue box 244, a review of systems dialogue box 245, a physical exam dialogue box 246, and a labs/imaging dialogue box 247. Each of these dialogue boxes 231-247 interfaces with the database repository 230, to store discrete data elements that are captured by each  
5 of these dialogue boxes.

In particular, the psychiatric diagnosis dialogue box 231 is configured to capture psychiatric diagnoses of psychiatric patients, as discrete data elements. The medical history dialogue box 232 is configured to capture non-psychiatric medical histories of psychiatric patients, as discrete data elements. The substance history  
10 dialogue box 233 is configured to capture histories of substance use by psychiatric patients, as discrete data elements. The medications dialogue box 234 is configured to capture information concerning medications used by psychiatric patients, as discrete data elements. The allergies dialogue box 235 is configured to capture information concerning allergies of psychiatric patients, as discrete data elements.  
15 The past psychiatric history dialogue box 236 is configured to capture past psychiatric histories of psychiatric patients, as discrete data elements. The developmental dialogue box 237 is configured to capture information concerning stages of development of psychiatric patients, as discrete data elements.

Moreover, the social history dialogue box 241 is configured to capture social  
20 histories of psychiatric patients, as discrete data elements. The family history dialogue box 242 is configured to capture information concerning family histories of psychiatric patients, as discrete data elements. The mental status exam dialogue box 243 is configured to capture results of standardized mental status tests of psychiatric patients, as discrete data elements. The mini mental status exam dialogue box 244 is  
25 configured to capture the results of short standardized mental status tests of psychiatric patients, as discrete data elements. The review of systems dialogue box 245 is configured to capture patient mental health complaints, as discrete data elements. The physical exam dialogue box 246 is configured to capture information concerning physical exams of psychiatric patients, as discrete data elements. Finally,  
30 the labs/imaging dialogue box 247 is configured to capture results of laboratory tests and/or medical imaging tests of psychiatric patients, as discrete data elements.

Accordingly, embodiments of the invention as shown in Figure 2B can be used in a clinical environment, such as in an emergency room module 110 and/or in an outpatient module 120 of Figure 1, and can offer psychiatrists a rich working

environment that is based on a clinical service line model. A clinical service line can gather information from a psychiatric patient at every clinical contact. For example, at an initial visit, a receptionist can gather demographic data. A nurse can gather clinically significant data like allergies, adverse reactions and medication lists, for example using the allergies dialogue box **235** and the medications dialogue box **234**. The psychiatrist can complete the medical record by entering a diagnosis using the psychiatric diagnosis dialogue box **231**. All of the data gathered at the various patient encounters can be automatically combined in the database repository **230**, to allow a complete and dynamic medical record to be created efficiently. This can reduce and preferably eliminate redundant data collection, and also can allow improvement in the clinical experience for the patient. Moreover, data that is collected in one environment, for example by the emergency room module **110** of Figure 1, also is available and accessible in other environments, such as in the outpatient module **120** of Figure 1, so that redundant information need not be entered and a complete picture of a patient's physical and mental health can be viewed. Finally, a longitudinal view of a patient's physical and mental health can be viewed so that the patient may be asked focused questions, thereby improving patient satisfaction with the clinical experience.

An electronic medical record, a clinical summary and a treatment timeline can be produced for each psychiatric patient. The electronic medical record can include the following information that may be collected at each clinical encounter: history of the present psychiatric illness (psychiatric diagnosis dialogue box **231**), past psychiatric history (past psychiatric history dialogue box **236**), medical history (medical history dialogue box **232**), substance-related history (substance history dialogue box **233**), medications list (medications dialogue box **234**), allergies list (allergies dialogue box **235**), social history (social history dialogue box **241**), family psychiatric history (family history dialogue box **242**), review of systems (review of systems dialogue box **245**), physical exam (physical exam dialogue box **246**), laboratory values, ECG imaging and imaging data (lab/imaging dialogue box **247**), and mental status exams (mental status exam dialogue box **243** and mini mental status exam dialogue box **244**).

As also shown in Figure 2B, psychiatric dialogue boxes and non-psychiatric medical dialogue boxes may be integrated in a single system and the information that is captured may be stored in a single database repository **230**. Thus, information

concerning medication side effects, lab values, medical history or allergies may be accessible to the psychiatrist, so that the psychiatrist can provide quality care. As was also described above, the dialogue boxes allow discrete data elements to be collected on every aspect of a patient's medical record, from social development and  
5 developmental history, to physical exams. Traditional text-based psychiatry thereby can be integrated with non-psychiatric medical information systems.

Moreover, the dialogue boxes **231-247** shown in Figure 2B may also allow analogous free text entry and storage into the database **230**, so that the stored data elements from the dialogue boxes **231-247** and free text may be combined to produce  
10 clinical reports instantly. For example, an initial evaluation with a history and physical, demographics, progress notes, medications list and a clinical summary may be produced, which includes discrete data elements from at least some of the dialogue boxes **231-247** of Figure 2B, along with accompanying free text. Thus, traditional free text-based psychiatry can be integrated with discrete data elements. Finally, the  
15 forms/reports function **190** can complete required standard paperwork using the discrete data elements that are entered as a result of the dialogue boxes **231-247**. For example, duplicate copies of state petition forms for involuntary commitment can be automatically completed using previously entered data elements.

Still referring to Figure 2B, a Global Assessment of Functioning (GAF) may  
20 be obtained from the database repository **230** or generated by the psychiatrist at Block **252**. The GAF may be used to formulate an assessment plan **254** for the patient.

Referring now to Figure 2C, having derived an assessment plan for the patient at Block **254** of Figure 2B, various dispositions of the patient then may be handled at Block **262**. As shown, if the disposition of the patient is to discharge the patient, then  
25 at Block **264**, a treatment planner dialogue box may be accessed. A universal medical form preview dialog box may be accessed at Block **266**, and if a decision is made to commit to outpatient at Block **268**, the requisite government forms, such as an involuntary commitment (QPE) form, may be filled in at Block **270**.

Returning to Block **262**, if a decision is made to admit the psychiatric patient,  
30 then the universal form preview dialogue box may be accessed at Block **282**, and if a decision is made to commit at Block **284**, then the requisite government forms, such as the QPE form, may be filled in at Block **286**. If the petitioner is not able to sign the form at Block **288**, then a petition also may be generated at Block **292**, for signature by the physician. If a decision is made not to commit the patient at Block **284**, a

decision is made at Block **294** as to whether a local facility is to be used for treatment. If no, then a transfer referral form is filled in at Block **296**. If yes, then at Block **298**, report navigation is performed by the system to determine the appropriate report that is used to effect the treatment at the local facility. Returning again to Block **262**, if

5 the disposition is for further consultation, a consult preview dialogue box **272** may be accessed. Accordingly, the dialogue boxes and other blocks of Figure 2C can create a paper bridge for psychiatry by allowing paper intensive psychiatric forms and reports to be generated, using data that was input using the dialog boxes and other blocks of Figure 2C. Finally, at Block **274**, the record is saved in the repository **230**.

10 Figure 3 is a flowchart illustrating the generation of reports, forms and other documentation for a psychiatric emergency room, such as may be provided by the emergency room module **110** of Figure 1, according to embodiments of the present invention. Figure 3 also illustrates interaction of an emergency room module with other modules, for example the modules of Figure 1 and the dialogue boxes of Figure

15 2B.

In particular, as shown at Block **302**, initial data gathering is performed using, for example, the dialogue boxes of Figure 2B. This data (Block **304**) is input into the repository **230** (labeled H&P for history and physical) at Block **306**, and the report generator **190** generates reports at Block **308**. Thus, information concerning an

20 emergency room psychiatric patient, including results of psychiatric tests and non-psychiatric medical tests, is stored in a database. A report is displayed of the information concerning the emergency room psychiatric patient, for review by a psychiatrist.

Still referring to Figure 3, a decision is then accepted at Block **312** as to

25 whether or not to admit the patient. If a decision is made not to admit the patient, then at Block **314**, triage is performed by accepting a decision for home treatment **324** or for treatment at a local hospital, here indicated as "Duke" at Block **316**. If to the local hospital, then various forms are automatically generated at Block **318** and an appointment slip may be faxed to the hospital at Block **322**. If another associated

30 local hospital at Block **326**, a release may be printed at Block **328**, if necessary, and the appropriate forms (Blocks **334** and **336**) may be provided to the various facilities as a result of a decision at Block **332** to select a local facility. Thus, selection of whether to commit the psychiatric patient or to treat the psychiatric patient on an outpatient basis is accepted. Forms for committing the psychiatric patient or for



treating the psychiatric on an outpatient basis may be automatically generated in response to the selection.

Referring again to Block **312**, if a decision is made to admit and a decision is made to commit at Block **342**, the requisite forms can be generated at Block **346**,  
 5 printed at Block **382**, signed at Block **384**, notarized at Block **386** and sent to the Provider Sponsored Organization (PSO) at Block **388** and to a magistrate if necessary. On the other hand, if a decision is made not to commit, then various forms are generated at Block **344**. If a decision is made at Block **348** to admit to the local hospital, then processing is performed at Block **352** to admit, forms are generated at  
 10 Block **354**, transport is arranged at Block **356**, and a fax is sent at Block **358**. If the commitment is not to the local hospital at Block **348**, then a transfer form is generated, a decision is made as to which non-local hospital is used at Block **364**, and processing is provided to a first local hospital at Block **368** along with appropriate forms at Block **372**. Alternatively, forms are generated/faxed at Blocks **374** and **378**,  
 15 and appropriate transport is arranged at Block **376**.

Figure 4 is a flowchart illustrating psychiatrist and database interaction to produce a treatment plan for a psychiatric patient, for example using the treatment plan module **170** of Figure 1. In general, information concerning symptoms, medications, psychological tests, psychological history and medical history of the  
 20 psychiatric patient is stored in a database. At least some of the stored information is displayed, and a treatment recommendation for the psychiatric patient is accepted in response to the display. The treatment recommendation for the psychiatric patient is stored in a database. A treatment plan for the psychiatric patient is automatically generated from the stored information from the stored treatment recommendation.

More specifically, as shown in Figure 4 at Block **402**, a background database is populated with stored data that may be obtained, for example using dialogue boxes **231-247** of Figure 2B. Provider information is obtained from a log-in knowledge database **404** and functional status is obtained from a functional database **406**. Primary diagnosis symptoms are obtained from a primary symptom database at Block  
 25 **408**. Medications and scales are obtained, for example from the dialog boxes **231-247** of Figure 2B, and the primary doctor symptoms then can be used to populate a Mental Status Exam (MSE) database **412**, a MEDS database **414** and a CGI database **416**. Test results from the psychiatric diagnosis dialogue box **231** also may be stored in a PDiagnosis database **422**. Results from the medical history dialogue box **232** may be

stored in the MHistory database **424**. Past psychiatric history may be stored in the Psycho database **426** and functional results may be stored in the GAF database **428**. A work-up is then provided to the psychiatrist at Block **430**, wherein the psychiatrist can order the lab and imaging data to be obtained in a LabsLimited database **432** and  
5 can order psychological testing in Scales databases **434**, **436** and **438**. Treatment recommendations are then made by the psychiatrist at Block **440**. These can include biological and psychological services and frequencies that are stored in databases **442**, **444**, **445** and **446**, and that also may be provided to a research database **447** and a clinics database **448**, depending on the services. Social treatments that are stored in  
10 the database **442** also may be ordered. Resources also may be committed and stored in the resources database **452** and referrals may be made using the referrals database **454**. Accordingly, as shown in Figure 4, data elements that are stored in a database repository may be used by a psychiatrist to work up a treatment plan, and to automatically generate treatment recommendations and commit resources for the  
15 treatment recommendations.

Finally, Figure 5 is a flowchart of interactions among psychiatrists, other personnel and databases to produce billings, for psychiatric treatment using a billing module, for example the billing module **160** of Figure 1. These embodiments of the invention can store a diagnosis of the psychiatric patient in a database, store  
20 identifications of providers of psychiatric services in a database and automatically generate a bill for the psychiatric treatment of the psychiatric patient from the diagnosis that is stored and the identifications that are stored.

Referring now to Figure 5, demographics and past billing information is imported into the system, for example using a private billing database **502** to populate  
25 patient and background database **504** and **506**. A diagnosis then is obtained from the databases **512**, **514**, **516**, **518**. Bills then are created using a Login database **522** that identifies providers of psychiatric treatments (psychiatrists, social workers and/or Ph.D.'s). The appropriate federal codes then are obtained from a database at Block **524**, and a billing code is obtained from database **526** for the services that were  
30 performed. Based on the location of the services as provided by databases **528** and **532**, the services are translated into billing information in database **534** and a billing file is created in database **536**. A bill is generated as text in database **538**. Accordingly, billing can be performed automatically using information gathered from multiple databases.

Embodiments of the present invention also can create efficiencies in management of psychiatric care. Efficiencies can come from improved processes of treatment and/or research and improved quality of treatment and/or research. In particular, the process of research and treatment can be automated using the report generator, the form duplicator and direct data entry. Continuous quality improvement also may be applied to research by taking advantage of information technology networks. Network information processing and centralized data collection can improve quality by adding responsiveness to problems and the flexibility of modification. The ability to monitor sites and data collection with online data analysis can facilitate the recognition of problems and the need for modifications quickly. Networking can offer the flexibility to implement these changes within hours, as opposed to days or weeks. Changes can be implemented and new versions can be distributed instantaneously to all sites.

In the drawings and specification, there have been disclosed typical preferred embodiments of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being set forth in the following claims.